

## **APPENDIX B. WATER HEATER PRICE DATABASE**

### **TABLE OF CONTENTS**

|       |   |      |
|-------|---|------|
| B.1   | WATER HEATER PRICE DATABASE - DESCRIPTION .....     | B-1  |
| B.1.1 | Background .....                                    | B-1  |
| B.1.2 | Data Collection Approach .....                      | B-1  |
| B.1.3 | Database Structure .....                            | B-2  |
| B.1.4 | Quality Control .....                               | B-5  |
| B.1.5 | Additional Data .....                               | B-5  |
| B.2   | WATER HEATER PRICE DATABASE - SUMMARY OF DATA ..... | B-5  |
| B.2.1 | Water Heaters by Rated Volume .....                 | B-6  |
| B.2.2 | Water Heaters by Manufacturer .....                 | B-8  |
| B.2.3 | Water Heaters by Shape .....                        | B-10 |
| B.2.4 | Water Heaters by Insulation Thickness Feature ..... | B-12 |
| B.2.5 | Water Heaters by Heat Trap Option .....             | B-15 |
| B.2.6 | Water Heaters by Vent Type .....                    | B-17 |
| B.2.7 | Water Heaters by Electronic Ignition Features ..... | B-18 |
| B.2.8 | Water Heaters by Length of Store Warranty .....     | B-19 |
| B.2.9 | Water Heaters by Installation Cost .....            | B-22 |

### **TABLES**

|             |  |      |
|-------------|--|------|
| Table B.1   | Variables and Definitions in Source Information Table .....                      | B-2  |
| Table B.2   | Variables and Definitions in Price Information Table .....                       | B-3  |
| Table B.3   | Variables and Definitions from Model Information Table .....                     | B-4  |
| Table B.4a  | Electric Water Heaters by Rated Volume .....                                     | B-6  |
| Table B.4b  | Gas-Fired Water Heaters by Rated Volume .....                                    | B-7  |
| Table B.5a  | Reported Electric Water Heaters by Manufacturer .....                            | B-8  |
| Table B.5b  | Reported Gas-Fired Water Heaters by Manufacturer .....                           | B-9  |
| Table B.6a  | Reported Electric Water Heaters by Shape .....                                   | B-11 |
| Table B.6b  | Reported Gas-Fired Water Heaters by Shape .....                                  | B-12 |
| Table B.7a  | Reported Electric Water Heaters by Insulation Thickness Feature .....            | B-13 |
| Table B.7b  | Reported Gas-Fired Water Heaters by Insulation Thickness Feature .....           | B-14 |
| Table B.8a  | Electric Water Heaters by Heat Trap Option .....                                 | B-15 |
| Table B.8b  | Gas-Fired Water Heaters by Heat Trap Option .....                                | B-16 |
| Table B.9   | Reported Gas-Fired Water Heaters by Vent Type .....                              | B-17 |
| Table B.10  | Reported Gas-Fired Water Heaters by Electronic Ignition Feature .....            | B-18 |
| Table B.11a | Reported Electric Water Heaters by Length of Store Warranty (in Years) ...       | B-20 |
| Table B.11b | Reported Gas-Fired Water Heaters by Length of Store<br>Warranty (in Years) ..... | B-21 |
| Table B.12  | Count of Water Heater Models Reported with Services and Fees .....               | B-22 |

## FIGURES

|             |   |      |
|-------------|---|------|
| Figure B.1a | Distribution of Electric Water Heaters by Rated Volume .....                            | B-7  |
| Figure B.1b | Distribution of Gas-Fired Water Heaters by Rated Volume .....                           | B-8  |
| Figure B.2a | Reported Electric Water Heaters by Manufacturer .....                                   | B-9  |
| Figure B.2b | Reported Gas-Fired Water Heaters by Manufacturer .....                                  | B-10 |
| Figure B.3a | Distribution of Electric Water Heaters by Shape .....                                   | B-11 |
| Figure B.3b | Distribution of Gas-Fired Water Heaters by Shape .....                                  | B-12 |
| Figure B.4a | Distribution of Electric Water Heaters by Insulation Thickness Feature .....            | B-13 |
| Figure B.4b | Distribution of Gas-Fired Water Heaters by Insulation Thickness Feature ...             | B-14 |
| Figure B.5a | Distribution of Electric Water Heaters by Heat Trap Option .....                        | B-16 |
| Figure B.5b | Distribution of Gas-Fired Water Heaters by Heat Trap Option .....                       | B-17 |
| Figure B.6  | Distribution of Gas-Fired Water Heaters by Vent Type .....                              | B-18 |
| Figure B.7  | Distribution of Total Gas-Fired Water Heaters by Electronic<br>Ignition Feature .....   | B-19 |
| Figure B.8a | Distribution of Electric Water Heaters by Length of Store Warranty<br>(in Years) .....  | B-20 |
| Figure B.8b | Distribution of Gas-Fired Water Heaters by Length of Store Warranty<br>(in Years) ..... | B-21 |
| Figure B.9a | Distribution of Electric Water Heaters by Fee Type .....                                | B-23 |
| Figure B.9b | Distribution of Gas-Fired Water Heaters by Fee Type .....                               | B-23 |

## **APPENDIX B. WATER HEATER PRICE DATABASE**

This appendix provides supplemental information for Chapter 5, Retail Prices. It focuses on a description of the Water Heater Price Database and its contents. These data are widely used throughout most of the water heater analysis. A summary of data contained in the database is also presented and discussed, targeting the most important variables. Distribution breakdowns in the form of tables and pie charts are available for review based on these data.

### **B.1 WATER HEATER PRICE DATABASE - DESCRIPTION**

#### **B.1.1 Background**

LBNL, with assistance from the Arthur D. Little, Inc. (ADL) and Pacific Northwest National Laboratory (PNNL), developed a database of specifications and retail prices for water heaters currently for sale in the U.S. This project was begun in 1997. The data collection and retail price analysis were completed in 1999. The information in the database includes changes made in response to comments received at the DOE Water Heater Workshop held on November 9-10, 1998.<sup>1</sup>

For the purposes of this analysis, the database was utilized in several ways. First, it was used to develop the median retail prices for all sizes of baseline water heaters as well as for median water heater installation costs. This information, together with the total water heater manufacturing costs, is used in the engineering analysis (Chapter 8) to determine manufacturer-to-retailer markup. Second, the distribution of retail prices and installation costs is used in the life-cycle cost analysis (Chapter 9). Third, the information contained in the database is a very useful reference tool and aids in determining the characteristics of water heaters currently on the market.

#### **B.1.2 Data Collection Approach**

The Water Heater Price Database contains information from a variety of sources, including more than 130 retailers, wholesalers, plumbers, contractors, and utility companies from all regions of the U.S. Information appears for more than 1,100 models, including retail prices, fees (installation, delivery, etc.), and length of manufacturer warranty. Detailed product specification information (i.e., certified energy factor, first hour ratings) from manufacturer product literature, phone calls to manufacturer technical information hotlines, Gas Appliance Manufacturers Association (GAMA), and California Energy Commission (CEC) directories is also included.

### B.1.3 Database Structure

The database contains three principal tables: the Source Information Table, the Price Information Table, and the Model Information Table. An additional table, Field Definitions Table, and a report entitled Introduction to Database, provide descriptive information but do not include water heater data.

The first three tables describe water heater model characteristics, retail prices and various installation costs. The Introduction to Database report describes the database and the Field Definitions Table defines the variables contained in the first three tables. The entire database is in Microsoft Access format.

The Source Information Table contains six fields that display information about sources from which water heater data were obtained. The table shows 131 sources. Table B.1 lists the variables and definitions in the Source Information Table.

**Table B.1 Variables and Definitions in Source Information Table**

| <b>Variable Name</b> | <b>Variable Definition</b>  |
|----------------------|---|
| SeqNum               | Sequential number of records in the Source Information Table                  |
| StoreCode            | Number assigned to information source; references the Price Information Table |
| CallDate             | Date the store was contacted  |
| Phone_Web            | Cost data collected from telephone conversation or web page                   |
| StoreState           | State in which store is located   |
| SalesTax             | Sales tax at store location   |

The Price Information Table consists of 10 fields with information about prices of water heaters reported by sources listed in the Source Information Table. There are 1,031 different water heater models listed in this table. Table B.2 lists the variables and definitions in the Price Information Table.

**Table B.2 Variables and Definitions in Price Information Table**

| <b>Variable Name</b> | <b>Variable Definition</b>   |
|----------------------|--|
| SeqNum               | Sequential number of records in the Price Information Table                                    |
| StoreCode            | Number assigned to information source; references the Source Information Table                 |
| StoreWarranty        | Warranty offered by store  |
| RetailPrice          | Retail price reported by source (sales tax not included)                                       |
| DeliveryFee          | Fee reported by source for delivery of water heater (if delivery service is available)         |
| InstallFee           | Fee reported by source for installation of water heater (if installation service is available) |
| RemovalFee           | Fee reported by source for removal of water heater (if removal service is available)           |
| PermitFee            | Fee reported by source for permits (if permit fee is available)                                |
| PartFee              | Fee reported by source for standard parts for installation (if part fee is available)          |
| ModelNumber          | Manufacturer water heater model numbers, references the Model Information Table                |

The Model Information Table contains 38 fields that provide detailed information about 1,121 water heater models. The data in this table include model numbers, manufacturers, product brands, product series, energy efficiency information, dimensions, design features, manufacturer warranties, and product literature references. Table B.3 lists the variables and definitions in the Model Information Table.

**Table B.3 Variables and Definitions from Model Information Table**

| <b>Variable Name</b> | <b>Variable Definition</b>   |
|----------------------|--|
| ModelNumber          | Model number specified by manufacturer, references the Price Information Table   |
| Manufacturer         | Name of manufacturer   |
| Brand                | Brand name of water heater   |
| Series               | Series name of water heater  |
| Baseline             | "T" (true) indicates baseline model  |
| Fuel                 | Water heater fuel type (natural gas, LPG, oil, or electric)  |
| RatedVolume          | Manufacturer rated storage volume of the water heater (in gallons)   |
| RatedInputGas        | Manufacturer rated input in BTU/hr (Gas-fueled models only)  |
| PowerLowerElem       | Nominal rating of lower element in kW (Electric models only)   |
| PowerUpperElem       | Nominal rating of upper element in kW (Electric models only)   |
| RatedInputOil        | Manufacturer rated fuel input in gallons/hour (Oil models only)  |
| Shape                | Shape of water heater jacket   |
| RE                   | "Recovery Efficiency", given in % (Gas-fueled and oil-fueled models only)  |
| EF                   | "Energy Factor" reported by GAMA Directory and/or CEC Directory  |
| EF-ProdLit           | "Energy Factor" reported by manufacturer in the product literature   |
| FirstHrRating        | "First Hour Rating" is a measure of the water heater's ability to provide hot water in gallons   |
| Gallons90F           | Gallon per hour recovery rate at a 90 degree F temperature rise  |
| InsulThick           | Jacket insulation thickness, in inches   |
| HeatTrap             | "T" (true) indicates that the model comes with heat traps, "F" (false) indicates that the model does not come with heat traps  |
| HeatTrapOption       | "T" (true) indicates that the model can be optionally equipped with heat traps   |
| Height               | Height of the water heater (from the bottom to the top of the jacket), in inches   |
| Diameter             | Diameter of the water heater jacket, in inches   |
| VentType             | Type of vent   |
| VentDiam             | Vent diameter, in inches   |
| AnodeRod             | Type, material, and/or position of the anode rod   |
| DrainValve           | Material of the drain valve  |
| Burner               | Type or material of the burner (Gas and Oil models only)   |
| ElecIgnition         | "T" (true) indicates that the model is equipped with electronic ignition, >blank< indicates that the model is not equipped with electronic ignition (Gas-fueled models only) |
| Lining               | Type or material of water heater tank lining   |
| Condensing           | Indicates that the model is designed to condense water vapor in the flue gases (Gas models only)   |
| Weight               | Shipping weight of water heater, in pounds   |
| MfrWarranty          | Warranty issued by the manufacturer  |
| PartsWarranty        | Parts warranty issued by the manufacturer  |
| RegulatedProduct     | Model covered by NAECA   |
| GAMADirectory        | Checked box = listed in GAMA Directory   |
| CECDirectory         | Checked box = listed in CEC Directory  |
| ProductLit           | Number listed on manufacturer's product literature or catalog where model specification information was found  |
| ReviewDate           | Date of most recent review   |

#### **B.1.4 Quality Control**

Initial data quality checks included reviewing ranges of energy factors (EFs) and rated volumes listed in the database and correcting as necessary. Data identified as outliers were checked for accuracy using additional sources, including manufacturer product literature, manufacturer technical support hotlines, and water heater directories.

We also compared the fraction of data sources by U.S. region with the fraction of national population in the same region. When regions were underrepresented, additional contacts were made to balance representation.

In order to insure that correct information had been recorded, water heater model information was checked against water heater directories and updated manufacturer product literature. As a result, some vital missing information was added (i.e., EF or design characteristics such as heat traps, insulation thickness, etc.).

At the start of the quality control process, 5% of entries were erroneous or had missing model numbers. These errors were largely a result of the practice in some stores of reporting cost data and store inventory numbers according to internal systems instead of using manufacturer model numbers. Usually enough associated information was recorded (i.e., brand, warranty, rated volume, etc.) to match the model sold with the actual manufacturer model number. As a result of supplemental contacts, we found data on missing model numbers in all but 1% of cases.

#### **B.1.5 Additional Data**

Some additional water heater price data were collected by PNNL in December 1998.<sup>2</sup> These data from contractors, utility rebate programs, wholesalers, and retailers added about 200 records to the Price Information Table. This contribution significantly increased the number of water heater models reported by wholesale outlets.

### **B.2 WATER HEATER PRICE DATABASE - SUMMARY OF DATA**

The tables in this appendix summarize the data contained in the Water Heater Price Database focusing on specific parameters and defining characteristics. Separate tables are shown for electric and gas-fired water heater models. In many cases, pie charts show percentage breakdowns of important characteristics.

### B.2.1 Water Heaters by Rated Volume

Tables B.4a and B.4b, respectively, show the number of electric water heaters and gas-fired water heaters in the database summarized by rated volume.

The sizes of water heaters in the analysis correspond to the sizes reported by GAMA for each fuel type <sup>3</sup>. The first column shows the standard rated volumes for the water heaters used in the analysis, the second column shows the number of units by rated volume in the database, and the third column shows the percentage of models that fall in each group. The table footnote indicates that some of the standard rated volumes may include several different sizes.

As shown in Tables B.4a and B.4b, the largest percentage of electric water heaters (44%) have a 50-gal rated volume and the largest percentage of gas-fired water heaters (45%) have a 40-gal rated volume.

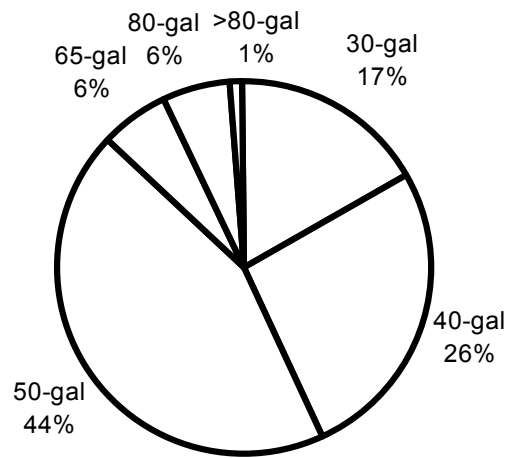
**Table B.4a Electric Water Heaters by Rated Volume**

| <b>Rated Volume<br/><i>gal</i></b> | <b>Number of Water Heater<br/>Models in Database</b> | <b>Water Heater Models by<br/>Rated Volume<br/><i>% of total</i></b> |
|------------------------------------|--|--|
| 30                                 | 80   | 17   |
| 40                                 | 125  | 26   |
| 50                                 | 209  | 44   |
| 65                                 | 28   | 6  |
| 80                                 | 29   | 6  |
| <b>&gt;80</b>                      | 6  | 1  |

Note: Rated volume of 30-gal includes GAMA listings of 28-gal and 30-gal, 40-gal includes GAMA listings of 38-gal and 40-gal, 50-gal includes GAMA listings of 50-gal and 52-gal, 65-gal includes GAMA listings of 65-gal and 66-gal and 80-gal includes GAMA listings of 75-gal, 80-gal and 82-gal. In addition, rated volumes above 80-gal include GAMA listings of 85-gal, 105-gal, 119-gal and 120-gal.



Figures B.1a and B.1b provide graphic breakdown of sizes for electric and gas-fired water heaters, respectively.

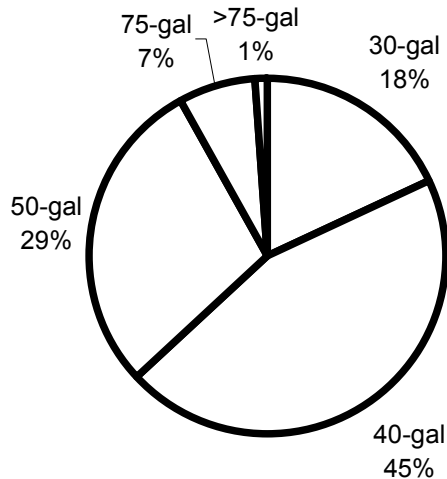


**Figure B.1a Distribution of Electric Water Heaters by Rated Volume**

**Table B.4b Gas-Fired Water Heaters by Rated Volume**

| <b>Rated Volume<br/><i>gal</i></b> | <b>Number of Water Heater<br/>Models in Database</b> | <b>Water Heater Models by<br/>Rated Volume<br/><i>% of total</i></b> |
|------------------------------------|--|--|
| 30                                 | 93   | 18   |
| 40                                 | 233  | 45   |
| 50                                 | 152  | 29   |
| 75                                 | 36   | 7  |
| >75                                | 4  | 1  |

Note: Rated volume of 30-gal includes GAMA listings of 30-gal, 40-gal includes GAMA listings of 38-gal, 39-gal and 40-gal, 50-gal includes GAMA listings of 48-gal and 50-gal, 75-gal includes GAMA listings of 65-gal and 75-gal. In addition, rated volumes above 75-gal include GAMA listings of 80-gal and 100-gal.



**Figure B.1b Distribution of Gas-Fired Water Heaters by Rated Volume**

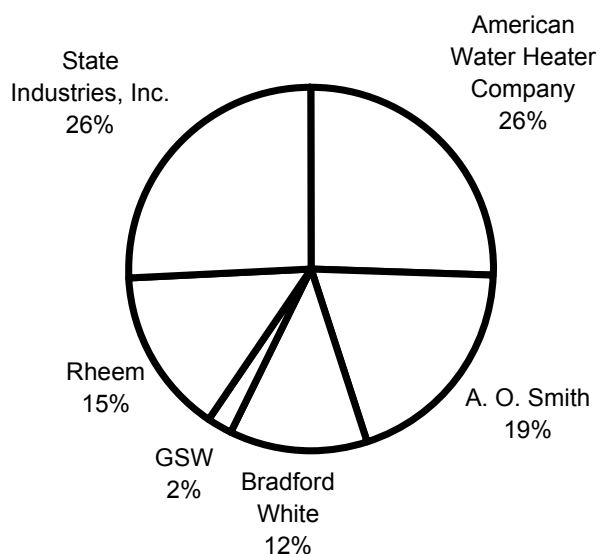
## B.2.2 Water Heaters by Manufacturer

The collected data represent models from six manufacturers of electric water heaters and seven manufacturers of gas-fired water heaters. Only manufacturers whose water heaters were reported as being sold by the sources that provided data are included in the Price Information Table. For this reason, some manufacturers listed in the GAMA directory, such as Aero, Bock, Heat Transfer Products, and Vaughn, are not found in the tables presented in this appendix. These manufacturers are represented, however, in the Model Information Table.

Tables B.5a and B.5b display the number of reported water heaters by manufacturer for both electric and gas-fired water heaters, respectively. Figures B.2a and B.2b show the percentages of the reported water heaters by manufacturer.

**Table B.5a Reported Electric Water Heaters by Manufacturer**

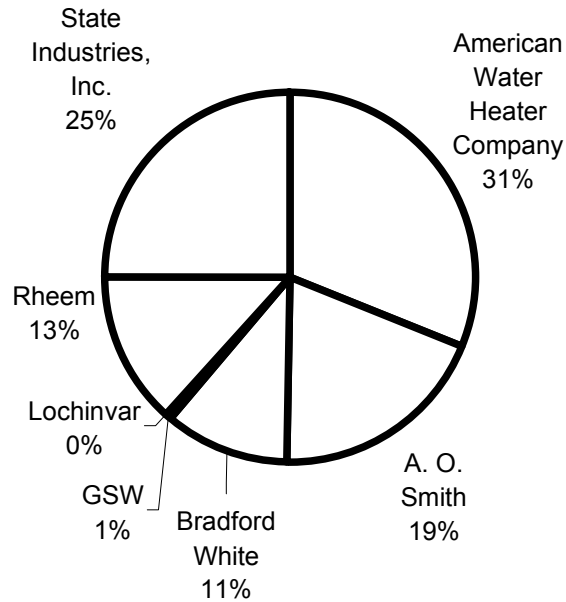
| MANUFACTURER                  | 30-gal | 40-gal | 50-gal | 65-gal | 80-gal | Total |
|-------------------------------|--------|--------|--------|--------|--------|-------|
| American Water Heater Company | 23     | 43     | 51     | 2      | 3      | 122   |
| A. O. Smith                   | 16     | 21     | 36     | 12     | 8      | 93    |
| Bradford White                | 2      | 9      | 40     | 2      | 5      | 58    |
| GSW                           | 4      | 2      | 4      | 0      | 0      | 10    |
| Rheem                         | 13     | 16     | 24     | 8      | 10     | 71    |
| State Industries, Inc.        | 22     | 34     | 52     | 6      | 9      | 123   |
| <b>Total</b>                  | 80     | 125    | 207    | 30     | 35     | 477   |



**Figure B.2a Reported Electric Water Heaters by Manufacturer**

**Table B.5b Reported Gas-Fired Water Heaters by Manufacturer**

| MANUFACTURER                  | 30 gal    | 40 gal     | 50 gal     | 75 gal    | Total      |
|-------------------------------|-----------|------------|------------|-----------|------------|
| American Water Heater Company | 26        | 77         | 50         | 8         | 161        |
| A. O. Smith                   | 17        | 48         | 25         | 10        | 100        |
| Bradford White                | 7         | 26         | 17         | 5         | 55         |
| GSW                           | 1         | 1          | 1          | 0         | 3          |
| Lochinvar                     | 0         | 0          | 1          | 0         | 1          |
| Rheem                         | 11        | 32         | 20         | 6         | 69         |
| State Industries, Inc.        | 31        | 49         | 38         | 11        | 129        |
| <b>Total</b>                  | <b>93</b> | <b>233</b> | <b>152</b> | <b>40</b> | <b>518</b> |



**Figure B.2b Reported Gas-Fired Water Heaters by Manufacturer**

### **B.2.3 Water Heaters by Shape**

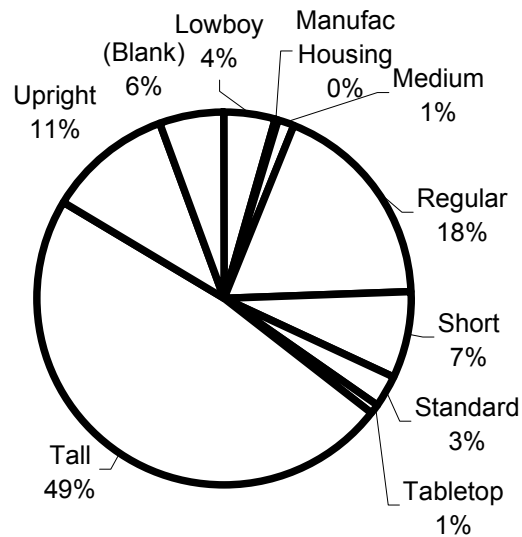
Water heater shape designations vary according to manufacturer. As a result, water heaters with different shape designations may have the same actual dimensions. Some manufacturers label water heater series or “families” with shape names while some do not designate their water heaters as having a specific shape. Most models in the database do have shape designations and are listed in Tables B.6a and B.6b according to their rated volume.

Nine shape designations are listed in the Water Heater Price Database for electric water heaters and eight are listed for gas-fired water heaters. A “Blank” designation has been added for water heaters with no reported shape designation.

Figures B.3a and B.3b provide graphic breakdowns of shapes for electric and gas-fired water heaters, respectively.

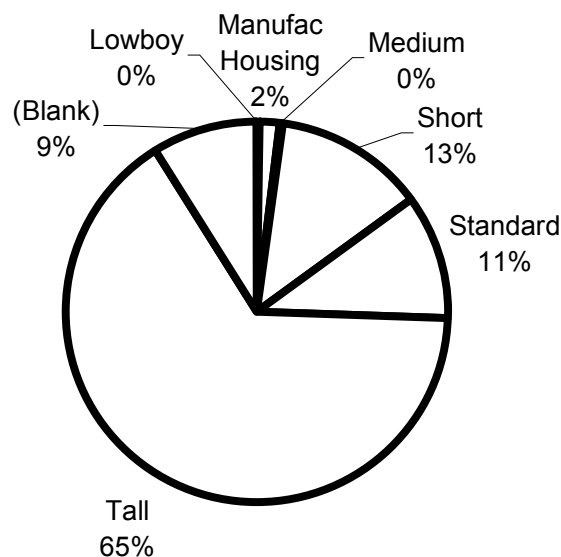
**Table B.6a    Reported Electric Water Heaters by Shape**

| Shape                | 30-gal    | 40-gal     | 50-gal     | 65-gal    | 80-gal    | Total      |
|----------------------|-----------|------------|------------|-----------|-----------|------------|
| Lowboy               | 8         | 7          | 6          | 0         | 0         | 21         |
| Manufacturer Housing | 1         | 0          | 1          | 0         | 0         | 2          |
| Medium               | 1         | 1          | 4          | 0         | 0         | 6          |
| Regular              | 3         | 34         | 44         | 2         | 5         | 88         |
| Short                | 5         | 8          | 22         | 0         | 0         | 35         |
| Standard             | 5         | 3          | 5          | 0         | 0         | 13         |
| Tabletop             | 0         | 4          | 0          | 0         | 0         | 4          |
| Tall                 | 48        | 53         | 90         | 17        | 22        | 230        |
| Upright              | 6         | 10         | 24         | 6         | 5         | 51         |
| (Blank)              | 3         | 5          | 13         | 3         | 3         | 27         |
| <b>Total</b>         | <b>80</b> | <b>125</b> | <b>209</b> | <b>28</b> | <b>35</b> | <b>477</b> |

**Figure B.3a    Distribution of Electric Water Heaters by Shape**

**Table B.6b Reported Gas-Fired Water Heaters by Shape**

| Shape                | 30-gal    | 40-gal     | 50-gal     | 75-gal    | Total      |
|----------------------|-----------|------------|------------|-----------|------------|
| Lowboy               | 0         | 2          | 0          | 0         | 2          |
| Manufacturer Housing | 2         | 6          | 0          | 0         | 8          |
| Medium               | 1         | 0          | 0          | 0         | 1          |
| Short                | 11        | 44         | 8          | 4         | 67         |
| Standard             | 9         | 24         | 16         | 6         | 55         |
| Tall                 | 66        | 133        | 114        | 26        | 339        |
| (Blank)              | 4         | 24         | 14         | 4         | 46         |
| <b>Total</b>         | <b>93</b> | <b>233</b> | <b>152</b> | <b>40</b> | <b>518</b> |

**Figure B.3b Distribution of Gas-Fired Water Heaters by Shape****B.2.4 Water Heaters by Insulation Thickness Feature**

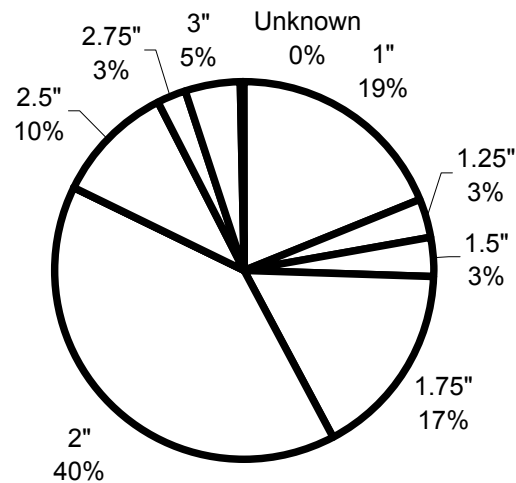
The jacket (sides and top) of water heaters are insulated with polyurethane foam or fiberglass. Most water heaters on the market today have at least 1-in. (2.5 cm) thick foam insulation, while some manufacturers provide 2- or 3-in. (5.1 or 7.6 cm) thick insulation.

Water heater insulation thickness varies between models and affects energy efficiency. The thickness is listed in the database in inches (manufacturers sometimes specify insulation thickness in inches and sometimes with an ‘R’ number, which is a measure of the thermal resistance of the insulation). The insulation thickness ranges from 1-in. to 3-in., in quarter inch (1/4-in.) increments. There are ten thickness designations listed in this table, including an “Unknown” specification for those models for which no insulation thickness information about was available.

Tables B.7a and B.7b display the number of reported water heaters with various insulation thicknesses for electric and gas-fired water heaters, respectively. Figures B.4a and B.4b provide the percentage breakdowns for reported water heaters by insulation thickness.

**Table B.7a Reported Electric Water Heaters by Insulation Thickness Feature**

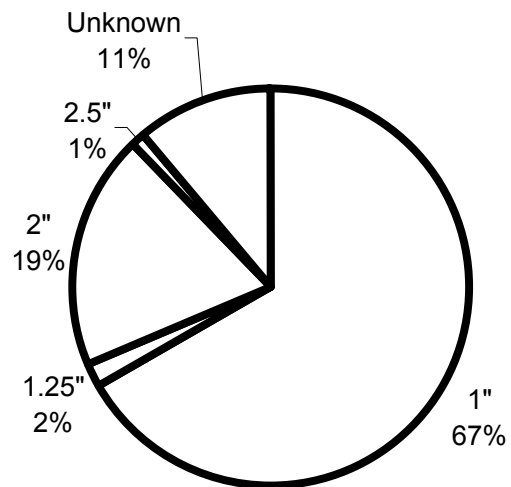
| <b>Insulation Thickness</b> | <b>30-gal</b> | <b>40-gal</b> | <b>50-gal</b> | <b>65-gal</b> | <b>80-gal</b> | <b>Total</b> |
|-----------------------------|---------------|---------------|---------------|---------------|---------------|--------------|
| 1"                          | 18            | 28            | 28            | 8             | 8             | 90           |
| 1.25"                       | 4             | 5             | 4             | 2             | 1             | 16           |
| 1.5"                        | 1             | 0             | 14            | 0             | 1             | 16           |
| 1.75"                       | 13            | 21            | 37            | 4             | 4             | 79           |
| 2"                          | 36            | 60            | 71            | 11            | 13            | 191          |
| 2.25"                       | 0             | 0             | 0             | 0             | 0             | 0            |
| 2.5"                        | 5             | 8             | 29            | 2             | 5             | 49           |
| 2.75"                       | 2             | 3             | 5             | 0             | 2             | 12           |
| 3"                          | 0             | 0             | 21            | 1             | 1             | 23           |
| Unknown                     | 1             | 0             | 0             | 0             | 0             | 1            |
| <b>Total</b>                | <b>80</b>     | <b>125</b>    | <b>209</b>    | <b>28</b>     | <b>35</b>     | <b>477</b>   |



**Figure B.4a Distribution of Electric Water Heaters by Insulation Thickness Feature**

**Table B.7b    Reported Gas-Fired Water Heaters by Insulation Thickness Feature**

| <b>Insulation Thickness</b> | <b>30-gal</b> | <b>40-gal</b> | <b>50-gal</b> | <b>75-gal</b> | <b>Total</b> |
|-----------------------------|---------------|---------------|---------------|---------------|--------------|
| 1"                          | 60            | 168           | 100           | 15            | 343          |
| 1.25"                       | 2             | 3             | 3             | 4             | 12           |
| 1.5"                        | 0             | 0             | 0             | 0             | 0            |
| 1.75"                       | 0             | 0             | 0             | 0             | 0            |
| 2"                          | 15            | 47            | 25            | 14            | 101          |
| 2.25"                       | 0             | 0             | 0             | 0             | 0            |
| 2.5"                        | 0             | 1             | 1             | 2             | 4            |
| 2.75"                       | 0             | 0             | 0             | 0             | 0            |
| 3"                          | 0             | 0             | 0             | 0             | 0            |
| Unknown                     | 16            | 14            | 23            | 5             | 58           |
| <b>Total</b>                | <b>93</b>     | <b>233</b>    | <b>152</b>    | <b>40</b>     | <b>518</b>   |

**Figure B.4b    Distribution of Gas-Fired Water Heaters by Insulation Thickness Feature**



### B.2.5 Water Heaters by Heat Trap Option

The database contains information about whether or not a listed water heater model is equipped with heat traps. Heat traps are a standard design feature of many models, but this is not true of all models nor are heat traps required for operation. In many cases, heat traps can be installed depending on the type of water heater and the water heater model design. Heat traps affect and usually improve the energy-efficiency performance of water heaters and are therefore an important design feature in performance analysis.

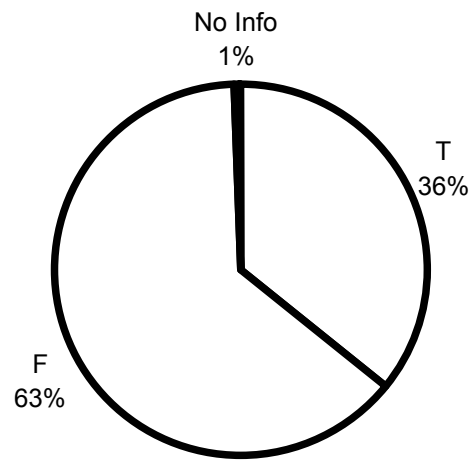
In reference to Tables B.8a and B.8b, a *T* (True) indicates that the designated water heaters are equipped with heat traps. An *F* (False) indicates that the designated water heaters are not equipped with heat traps. A *0* (zero) means that it is unknown whether or not the designated water heaters are equipped with heat traps; the information either was not reported or is not provided in product literature. All manufacturers who make water heaters that could benefit from the heat trap design option offer energy-saving models that incorporate heat traps. They can either be installed at the factory or on site. For this reason, a designation of *F* (False) in the database does not indicate that a water heater is unable to support a heat trap, rather, it indicates that the water heater is not equipped with heat traps when it comes from the factory.

Figures B.5a and B.5b provide percentage breakdowns of water heaters by heat trap option for electric and gas-fired water heaters, respectively.

In general, a majority of water heaters reported for each fuel category are listed as not being equipped with heat traps.

**Table B.8a Electric Water Heaters by Heat Trap Option**

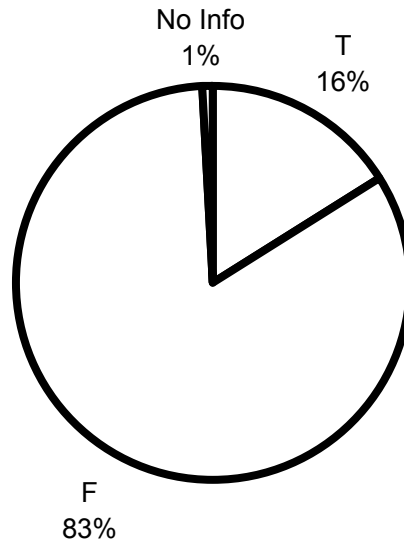
| <b>Heat Trap</b> | <b>30-gal</b> | <b>40-gal</b> | <b>50-gal</b> | <b>65-gal</b> | <b>80-gal</b> | <b>Total</b> |
|------------------|---------------|---------------|---------------|---------------|---------------|--------------|
| <i>T</i>         | 27            | 45            | 81            | 4             | 14            | 171          |
| <i>F</i>         | 52            | 80            | 127           | 24            | 20            | 303          |
| <i>0</i>         | 1             | 0             | 1             | 0             | 1             | 3            |
| <b>Total</b>     | 80            | 125           | 209           | 28            | 35            | 477          |



**Figure B.5a** Distribution of Electric Water Heaters by Heat Trap Option

**Table B.8b** Gas-Fired Water Heaters by Heat Trap Option

| Heat Trap    | 30 gal | 40 gal | 50 gal | 75 gal | Total |
|--------------|--------|--------|--------|--------|-------|
| <i>T</i>     | 12     | 36     | 31     | 5      | 84    |
| <i>F</i>     | 80     | 196    | 121    | 32     | 429   |
| <i>0</i>     | 1      | 1      | 0      | 3      | 5     |
| <b>Total</b> | 93     | 233    | 152    | 40     | 518   |



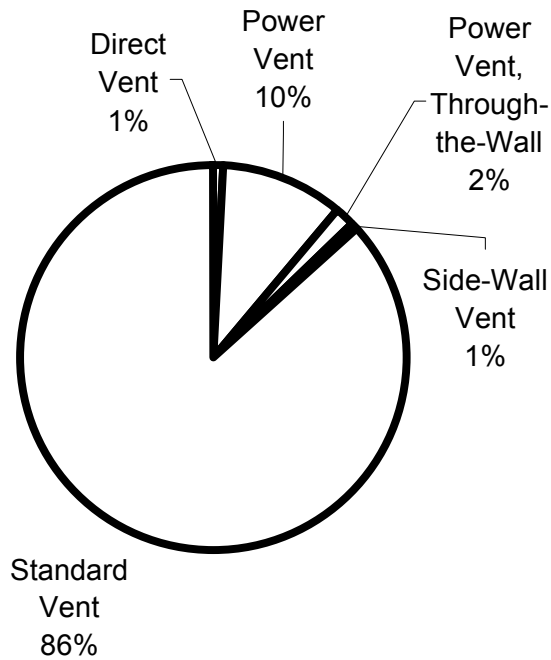
**Figure B.5b Distribution of Gas-Fired Water Heaters by Heat Trap Option**

#### **B.2.6 Water Heaters by Vent Type**

Some gas-fired water heaters are equipped with special vent features, such as direct vents, power vents, through-the-wall vents, and side-wall vents (electric is not represented). Table B.9 and Figure B.6 display the number of water heaters that have special vents.

**Table B.9 Reported Gas-Fired Water Heaters by Vent Type**

| <b>Vent Type</b>             | <b>30-gal</b> | <b>40-gal</b> | <b>50-gal</b> | <b>75-gal</b> | <b>Total</b> |
|------------------------------|---------------|---------------|---------------|---------------|--------------|
| Direct Vent                  | 0             | 5             | 0             | 0             | 5            |
| Power Vent                   | 7             | 20            | 16            | 10            | 53           |
| Power Vent, Through-the-Wall | 0             | 6             | 2             | 0             | 8            |
| Side-Wall Vent               | 0             | 2             | 1             | 0             | 3            |
| Standard Vent                | 86            | 200           | 133           | 30            | 449          |
| <b>Total</b>                 | <b>93</b>     | <b>233</b>    | <b>152</b>    | <b>40</b>     | <b>518</b>   |



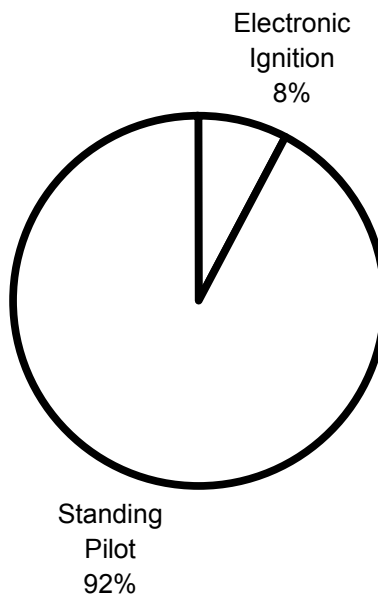
**Figure B.6 Distribution of Gas-Fired Water Heaters by Vent Type**

### **B.2.7 Water Heaters by Electronic Ignition Features**

Electronic ignition systems can replace the standing pilot. The electronic ignition feature is only available for gas-fired water heaters. Table B.10 and Figure B.7 display the number and percentages of reported water heaters with the electronic ignition feature and with the standing pilot.

**Table B.10 Reported Gas-Fired Water Heaters by Electronic Ignition Feature**

| Feature             | 30-gal | 40-gal | 50-gal | 75-gal | Total |
|---------------------|--------|--------|--------|--------|-------|
| Electronic Ignition | 6      | 15     | 12     | 7      | 40    |
| Standing Pilot      | 87     | 218    | 140    | 33     | 478   |



**Figure B.7     Distribution of Total Gas-Fired Water Heaters by Electronic Ignition Feature**

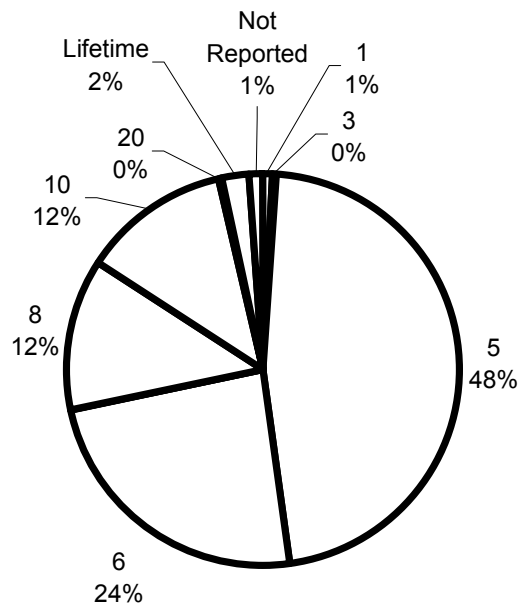
### **B.2.8   Water Heaters by Length of Store Warranty**

Every water heater comes with a warranty, usually set by the manufacturer. Since the warranty period directly affects the water heater price, retailers may sell water heaters with their own warranties. Tables B.11a and B.11b display the store warranty periods for water heaters reported in the Water Heater Price Database.

Figures B.8a and B.8b provide percentage breakdowns of reported water heaters by length of store warranty for electric and gas-fired water heaters, respectively.

**Table B.11a Reported Electric Water Heaters by Length of Store Warranty (in Years)**

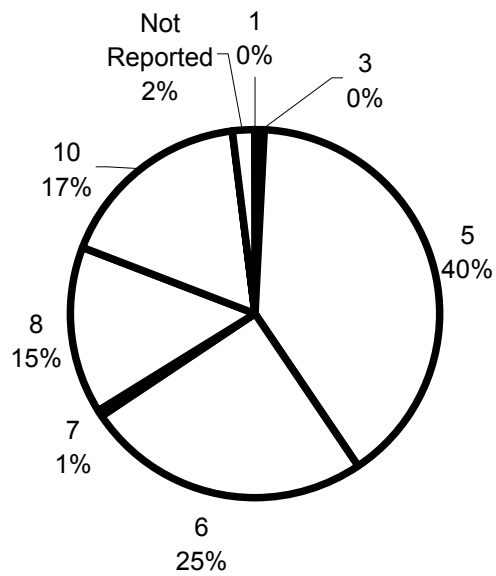
| Warranty Period<br><i>years</i> | 30-gal    | 40-gal     | 50-gal     | 65-gal    | 80-gal    | Total      |
|---------------------------------|-----------|------------|------------|-----------|-----------|------------|
| 1                               | 4         | 0          | 0          | 0         | 0         | 4          |
| 3                               | 0         | 0          | 0          | 0         | 1         | 1          |
| 5                               | 47        | 58         | 93         | 14        | 11        | 223        |
| 6                               | 17        | 25         | 54         | 7         | 11        | 114        |
| 7                               | 0         | 0          | 0          | 0         | 0         | 0          |
| 8                               | 3         | 25         | 27         | 2         | 2         | 59         |
| 10                              | 7         | 16         | 24         | 5         | 7         | 59         |
| 20                              | 0         | 0          | 1          | 0         | 0         | 1          |
| Lifetime                        | 1         | 1          | 6          | 0         | 3         | 11         |
| Not Reported                    | 1         | 0          | 4          | 0         | 0         | 5          |
| <b>Total</b>                    | <b>80</b> | <b>125</b> | <b>209</b> | <b>28</b> | <b>35</b> | <b>477</b> |



**Figure B.8a Distribution of Electric Water Heaters by Length of Store Warranty (in Years)**

**Table B.11b Reported Gas-Fired Water Heaters by Length of Store Warranty (in Years)**

| Warranty Period<br><i>years</i> | 30-gal | 40-gal | 50-gal | 75-gal | Total |
|---------------------------------|--------|--------|--------|--------|-------|
| 1                               | 2      | 0      | 0      | 0      | 2     |
| 3                               | 0      | 0      | 0      | 2      | 2     |
| 5                               | 48     | 90     | 54     | 14     | 206   |
| 6                               | 22     | 55     | 38     | 15     | 130   |
| 7                               | 0      | 2      | 1      | 0      | 3     |
| 8                               | 8      | 37     | 28     | 3      | 76    |
| 10                              | 12     | 43     | 28     | 6      | 89    |
| 20                              | 0      | 0      | 0      | 0      | 0     |
| Lifetime                        | 0      | 0      | 0      | 0      | 0     |
| Not Reported                    | 1      | 6      | 3      | 0      | 10    |
| <b>Total</b>                    | 93     | 233    | 152    | 40     | 518   |



**Figure B.8b Distribution of Gas-Fired Water Heaters by Length of Store Warranty (in Years)**

### B.2.9 Water Heaters by Installation Cost

Installation costs were collected with retail price data. Five types of fees listed in the database make up the installation costs used in the analysis: delivery fee, installation fee, removal fee, permit fee, and parts fee. The delivery fee is the cost to deliver the purchased water heater to the consumer's home or building. The installation fee is the charge to the consumer to install a water heater. The removal fee is the charge to the consumer for removing an existing water heater and usually includes disposal of the removed water heater. The permit fee reflects the charge for a water heater installation permit. The parts fee is the fee charged to the consumer for parts provided by the installer. Each fee listed in the database refers to a charge set by the distributor for the specific service provided.

Fees were not reported for each distributor because many retailers do not offer the services that would result in fees or they combine several fees into the retail price. Table B.12 shows the breakdown by fee for the two main fuel types.

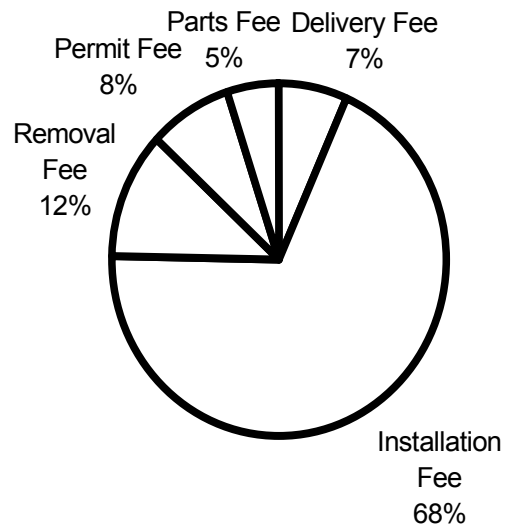
**Table B.12 Count of Water Heater Models Reported with Services and Fees**

| <b>Fee Type</b>         | <b>Electric</b> | <b>Gas</b> |
|-------------------------|-----------------|------------|
| <b>Delivery Fee</b>     | 23              | 24         |
| <b>Installation Fee</b> | 234             | 281        |
| <b>Removal Fee</b>      | 40              | 38         |
| <b>Permit Fee</b>       | 28              | 30         |
| <b>Parts Fee</b>        | 17              | 5          |

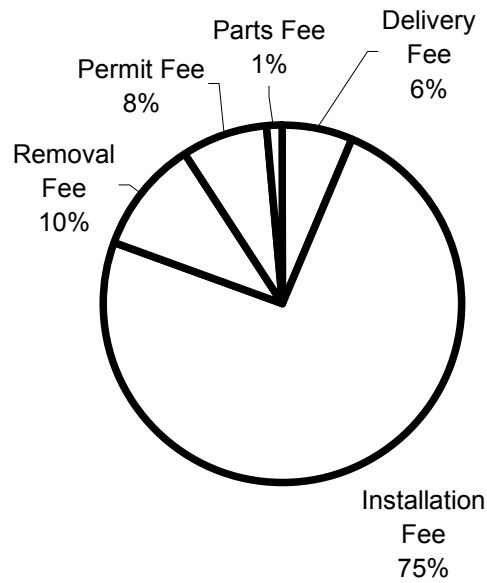
Of the stores that provided sales information on electric water heaters, 49.1% reported installation prices. Of those stores that provided sales information on gas-fired water heaters, 54.2% reported installation prices.

Figures B.9a and B.9b display the distribution of water heaters by fee type for electric and gas-fired water heaters, respectively.





**Figure B.9a Distribution of Electric Water Heaters by Fee Type**



**Figure B.9b Distribution of Gas-Fired Water Heaters by Fee Type**

## REFERENCES

1. U.S. Department of Energy-Office of Codes and Standards, *Workshop Regarding Water Heater Energy Efficiency Standards, Preliminary Analysis*, 1998. <[http://www.eren.doe.gov/buildings/codes\\_standards/notices/notc0017/index.htm](http://www.eren.doe.gov/buildings/codes_standards/notices/notc0017/index.htm)>
2. U.S. Department of Energy-Office of Codes and Standards, *Water Heater Price Database*, 1999. (Last accessed April 26, 1999). <[http://www.eren.doe.gov/buildings/codes\\_standards/applbrf/waterheater.htm](http://www.eren.doe.gov/buildings/codes_standards/applbrf/waterheater.htm)>
3. Gas Appliance Manufacturers Association, *Consumers' Directory of Certified Efficiency Ratings for Residential Heating and Water Heating Equipment*, April, 1999. Cortland, NY. Including First Supplement dated May 1999. Prepared by Intertek Testing Services.